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TAXONOMIC REVISION OF THE *RITAE* SPECIES-GROUP OF THE GENUS *MYRMICA* (HYMENOPTERA, FORMICIDAE)

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Taxonomic revision of the *ritae* species-group of the genus *Myrmica* (Hymenoptera, Formicidae) Radchenko A. G., Elmes. G. W. — The early forms of the genus *Myrmica* are believed to have been morphologically similar to *Myrmica ritae* which lives in the mountains of Burma. We propose that *M. ritae* and ten other morphologically similar species from the Himalaya and mountains of Taiwan, form a distinct group of primitive *Myrmica* species (*ritae* group). Six of these species have been described previously (*M. ritae, M. margaritae, M. formosae, M. serica, M. indica, M. gigantea*) and descriptions are provided of five new species (*M. urbanii, M. rigatoi, M. boltoni, M. martensi, M. collingwoodi*). Tables of various morphometrics and body shape indices are given for all these species, which have been compared with each other and with the relevant type specimens, to produce a key for the identification of the workers. Females of *M. martensi* and *M. collingwoodi*, and males of *M. indica* and *M. serica* are described. This is the first description of any males from the ritae group; they have short antennal scapes, which is believed to be a primitive characteristic among *Myrmica* males.

Key words: Ants, Formicidae, Central-Asia, new-species, descriptions, identification-key.

Таксономическая ревизия группы *ritae* рода *Myrmica* (Hymenoptera, Formicidae). Радченко А. Г., Элмс Г. В. — Наиболее древние известные ископаемые виды *Myrmica* морфологически близки к *Myrmica ritae*, обитающего в горах Бирмы и Таиланда. Мы объединяем *M. ritae* и 10 других близких видов, распространенных в Гималаях, горах Юго-Восточной Азии, южного Китая и Тайваня, в группу *ritae* и считаем, что они являются наиболее примитивными в роде *Myrmica*. 6 видов из этой группы были описаны ранее (*M. ritae, M. margaritae, M. formosae, M. serica, M. indica, M. gigantea*), а 5 новых видов описываются ниже (*M. urbanii, M. rigatoi, M. boltoni, M. martensi, M. collingwoodi*). Впервые описанные самцы видов этой группы (*M. serica, M. indica*) имеют короткий скапус антенн, что является примитивным признаком в роде *Myrmica*. Приведена определительная таблица видов группы *ritae*, а также таблицы с промерами всех видов, включая типовой материал.

Ключевые слова: муравьи, Formicidae, Центральная Азия, описание новых видов, определитель.

Introduction

The genus *Myrmica* is well represented among the myrmecofauna of the Holarctic Region. The majority of *Myrmica* species are found in the forests, meadows and mountains of the temperate north where some can be very abundant. In general they are associated with humid habitats and although the genus includes a few hemi-xerophilous steppe species, true desert and semi-desert dwellers are absent. Some *Myrmica* species can tolerate quite cold conditions, some species live in the boreal Forest-Tundra zones and others on more southerly montane tundras, for example, *Myrmica* ants have been recorded at altitudes up to 3600 m in the Pamirs and 4500-4800 m in Himalaya and Tibet. As far as is known, all species of *Myrmica* are generalist scavengers and predators, which construct nests in soil, often under stones, in moss, in rotting wood and occasionally, in leaf litter (Elmes 1991). Colonies usually contain from several hundreds to several thousand workers and from one to tens or even hundreds, of queens (Wardlaw & Elmes, 1996).

Currently, about 130 species and infra-specific forms of *Myrmica* are recognised (Bolton, 1995), of which more than 100 live in Eurasia. Due to the abundance of these ants in Europe and North America there have been numerous publications on their biology and taxonomy, but surprisingly, there has never been a full taxonomic revision of the genus. Most recently there have been major revisions and reviews of the *Myrmica* of Europe, Caucasus, former USSR and adjacent countries (Seifert, 1988; Radchenko, 1994 a-f).

A few *Myrmica* species have been found in the Oriental zoogeographical region, including *Myrmica ritae* Emery and *Myrmica margaritae* Emery which were first reported from the mountains of Burma in 1869.

They are quite distinct from typical *Myrmica*, the most obviously different features being their long epinotal spines, elongated long slender petioles and comparatively very coarse sculpture. Since 1869 a further 5 species and infra specific forms were described from the mountains of Burma, north-east India, Himalaya and Taiwan, which Radchenko (1994a) placed together as the ritae-group, which he believed to be the most "primitive" of the eight taxonomic groupings to which he assigned all the Eurasian *Myrmica* species.

An understanding of this group might be important to an eventual understanding the phylogeny of *Myrmica*, but the taxonomic relationships within the ritae-group have not been fully investigated. We were fortunate in being given access to several collections of unidentified *Myrmica* which included specimens belonging to the ritae-group. After examination of the type specimens we have identified several new species and the first males known to belong to the ritae-group. In this paper we describe these new species, revise the existing taxonomy and provide a key for the identification of the species forming the ritae-group.

Material and metods

This paper is based on the study of material from Naturhistorisches Museum, Basle (BASLE); The British Museum of Natural History, London (BMNH); Museum of Comparative Zoology of Harvard University (MCZ); Muséum d'Histoire Naturelle, Genéve (MHNG); Institute of Zoology of Ukrainian National Academy of Sciences, SIZK (SIZK); Museo Civico di Storia Naturale, Genova (MCSNG); Zoological Museums of ZMMU State University (ZMMU); Zoologisches Museum, Humboldt Universitét, ZMHUB (ZMHUB); Zoological Institute of Russian Academy of Sciences, St.-Petersburg (ZIN); and the collections of Graham Elmes, Institute of Terrestrial Ecology, UK (ELMES); Fabrizio Rigato, University of Milan (RIGATO); Philip Ward, University of California, USA (WARD); Jochen Martens, University of Mainz, Germany (MARTENS); Andreas Schulz, Leichlingen, Germany (SCHULZ).

We have made the following measurements on the type specimens and where possible a minimum sample of 15 specimens from other series:

HL length of head in dorsal view, measured in a straight line from the anterior point of median clypeal margin to mid-point of the occipital margin.
HW maximum width of head in dorsal view behind the eyes.
FW minimum width of frons between the frontal lobes.
FLW maximum width between external borders of the frontal lobes.
SL maximum straight-line length of antennal scape seen in profile.
AL diagonal length of the alitrunk seen in profile, from the neck shield to the posterior margin of metapleural lobes (workers) and from the anterio-dorsal point of alitrunk to posterior margin of metapleural lobes (females and males).
HTL length of tibia of hind leg.
PNW maximum width of pronotum from above in dorsal view (workers)
SCW maximum width of scutum from above (females and males).
SCL length of scutum+scutellum from above (females and males).
AH height of alitrunk, measured from upper level of mesonotum perpendicularly to the level of lower margin of mesopleurae (females and males).
PL maximum length of petiole from above.
PPL maximum length of postpetiole from above.
PW maximum width of petiole from above.
PPW maximum width of postpetiole from above.
PH maximum height of petiole in profile.
PPH maximum height of postpetiole in profile.
ESL maximum length of propodeal spine in profile.
ESD distance between tips of propodeal spine from above.
WL maximum length of forewing (males and females).
WB maximum breadth of forewing (males and females).

Although there are problems associated with using simple ratios of measurements to compare species, this has been the convention in many taxonomic publications on *Myrmica* (*e.g.* Arnoldi 1934; Sadil 1951; Seifert 1988). We therefore calculate various indices as follows.

Cephalic	CI = HL/HW	Spine-width	ESDI = ESD/ESL
Frontal	FI = FW/HW	Alitrunk	AI = AL/AH
Frontal-lobe	FLI = FLW/FW	Hind-tibia	HTI = HTL/HW
Scape (1)	SI1 = SL/HL	Scutum	SCI = SCL/SCW
Scape (2)	SI2 = SL/HW	Wing-length (1)	WI1 = WL/HW
Petiole (1)	PI1 = PL/PH	Wing-length (2)	WI2 = WL/WB
Petiole (2)	PI2 = PL/HW		
Post-petiole (1)	PPI1 = PPL/PPH		
Post-petiole (2)	PPI2 = PPH/PPW		
Post-petiole (3)	PPI3 = PPW/PW		
Spine-length	ESLI = ESL/HW		

Results

Diagnosis of the *ritae* group. Prior to this study the *ritae* group comprised 7 species and infra-specific forms which were easy to separate from the other *Myrmica* groups (Radchenko 1994a), all being characterised by an extremely coarse sculpture and an elongated petiolar region. We considered one of these forms to be a junior synonym but we also recognise 5 new species, which we describe below. However, three of these new species show features of morphology which are intermediate between those of *M. ritae* and *Myrmica inesae* Forel, and an as yet, undescribed species from western China.

Although the *ritae* group can no longer be regarded as being very distinct from other *Myrmica* species we consider it relatively easy to discriminate by:

- relatively long propodeal spines: ESLI 0.44–0.73 for workers (w) and 0.44–0.62 for females (f), except *M. gigantea* (ESLI < 0.35 both castes);
- post-petiole from above shaped like a fig;
- long and low petiole: PI1 1.38–2.19 (w) & 1.22–1.84 (f); PI2 0.43–0.68 (w) and 0.58–0.69 (f);
- long antennal scapes, often longer than the head, gradually and weakly curved at their base (w & f):- SI1 0.97–1.21 (w) & 0.90–1.10 (f);
- antennal scape of males short: SI1 0.35–0.49.

We found it easy to separate the species into two complexes: the *ritae*-complex (*M. ritae, M. margaritae, M. serica, M. formosae, M. indica, M. gigantea, M. urbanii and M. rigatoi*) and the boltoni-complex (M. boltoni, M. collingwoodi and M. martensi). The first is characterised by a very coarsely rugose head and alitrunk, and by smooth surfaces between rugae on the head dorsum, whereas the *boltoni*-complex has much more finely rugulose or even striated, heads and alitrunks, and head dorsums with distinctly punctured surfaces between the rugae. The rugosity of the frons between the frontal carinae level with the eyes, is an important character in discriminating between species of the *ritae*-complex: subsequently we call this area the Central Frons.

1. *Myrmica ritae* Emery, 1889 (Figs. 1, *1-3*)

Myrmyca ritae Emery, 1889: 501, pl. 11, fig. 27, w, Burma [Tenasserim], lectotype in MCSNG, paralectotypes in MHNG, MCZ and ZMHUB, studied; Forel, 1903: 696; Bingham, 1903: 267; Emery, 1921: 38; Weber, 1950: 219; Chapman and Capco, 1951: 128; Radchenko, 1994a: 44; Bolton, 1995: 282, nec Collingwood, 1970: 394 (Nepal).

Material examined: the lectotype worker (our designation) from Tenasserim, M. Mooleyit, 1000–1300 m, leg. Fea, Apr. 1887, and 3 paralectotype workers having the same labels; 3 workers, Nordtailand, Prov. Chiang Mai, Doi Inthanon, N.P. Gipfelregion, 1800–2000 m, 1.11.1995, leg. Schulz and Vock.

Measurements and indices are given in Tables 1–3. *M. ritae* differs from all other species of the *ritae*-complex by having straight, not sinuous rugae on its head dorsum, and by its distinctly bicoloured body: a reddish-yellow head, brownish-yellow legs and yellowish-brown gaster contrast distinctly with its dark brown alitrunk. The recent record by Schulz and Vock from Thailand, is the first since the original from the mountains of Burma. Its ecology is unknown.

Females and males are unknown.

2. *Myrmica margaritae* Emery, 1889 (Figs. 1, *4–6*)

Myrmica margaritae Emery, 1889: 502, w, Burma [Tenasserim], lectotype in MCSNG, studied; Forel, 1902: 696; Bingham, 1903: 267; Emery, 1921: 38; Weber, 1950: 219; Chapman and Capco, 1951: 127; Radchenko, 1994a: 44; Bolton, 1995: 281.

Material examined: the lectotype worker (our designation), Tenasserim, M. Mooleyit, 1800-1900 m, leg. Fea, Marzo 1887.

Measurements and indices are in Tables 1 & 3. *M. margaritae* differs from all other species of the *ritae*-complex, by having very few outstanding hairs on the alitrunk and head and except *M. formosa,* by its extremely coarse rugae of the head dorsum.

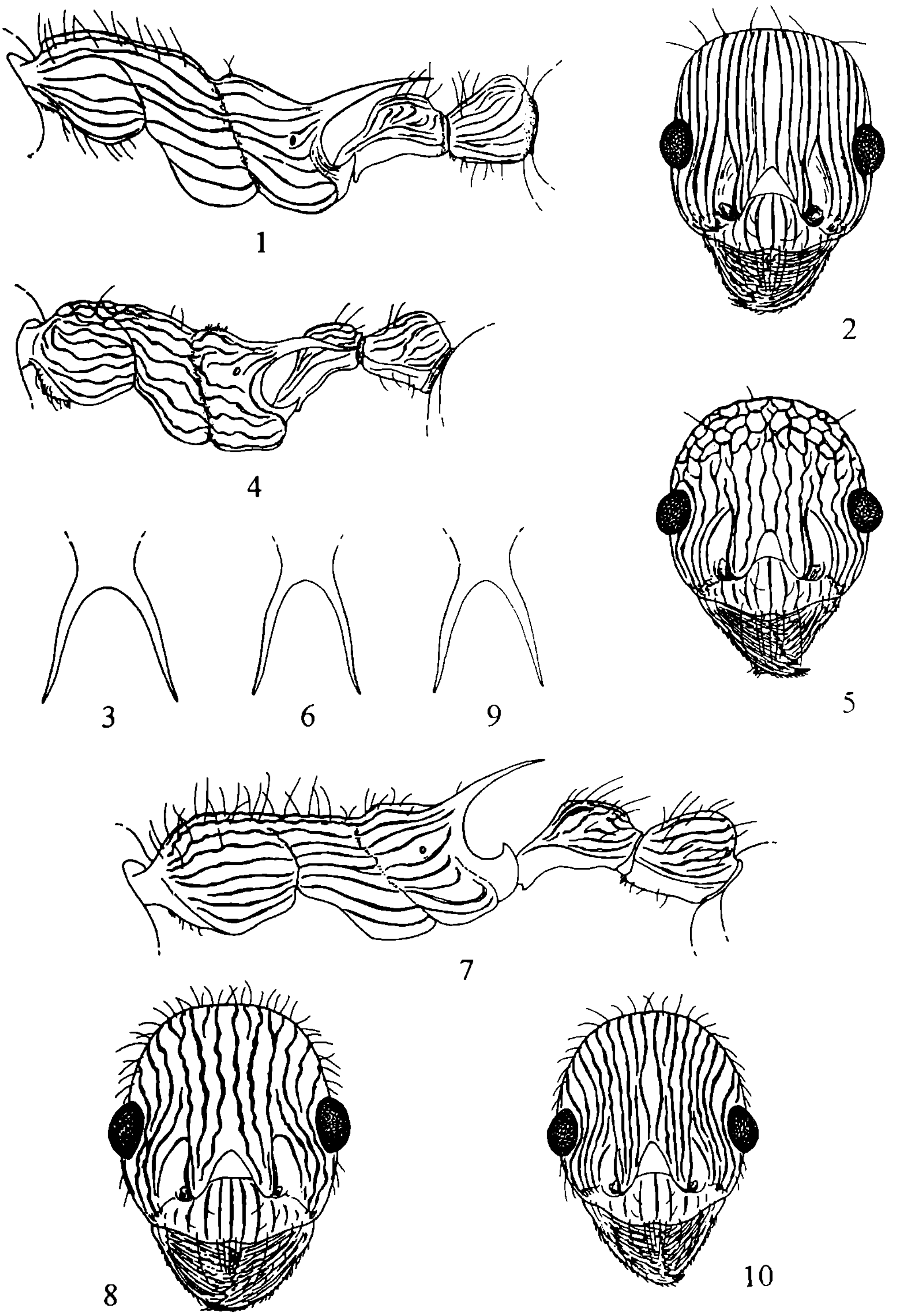


Fig. 1. *M. ritae* lectotype worker (1–3); *M. margaritae* lectotype worker (4–6); *M. formosae* lectotype worker (7–9); *M. margaritae* var. *pulchella*, paralectotype, the small different worker (10). 1, 4, 7 — alitrunk, petiole and postpetiole in profile; 2, 5, 8, 10 — head, frontal view; 3, 6, 9 — propodeal spine from above.

Рис. 1. M. *ritae*, рабочий, лектотип (1–3); *M. margaritae* рабочий, лектотип (4–6); *M. formosae* рабочий, лектотип (7–9); *M. margaritae* var. *pulchella*, мелкий рабочий, паралектотип (10). 1, 4, 7 — грудь, петиолюс и постпетиолюс в профиль; 2, 5, 8, 10 — голова спереди; 3, 6, 9 — шипы проподеума сверху.

The central frons has only four rugae like *M. formosae*, from which it differs by its upper quarter of head dorsum having coarse reticulate sculpture like that of *M. gigantea* and *M. urbanii*. Its head, alitrunk and pedicel are dark brown while its gaster and legs are light brownish-yellow. *M. margaritae* is known only from its type locality in Burma, where its ecology is unknown.

Females and males are unknown.

3. *Myrmica formosae* Wheeler, 1929 (Fig. 1, *7–9*)

Myrmica margaritae var. *formosae* Wheeler, 1929: 37, w, Taiwan [Formosa], lectotype in MCZ, paralectotypes in MCZ and ZMMU, studied; (*Myrmica margaritae* var. *formosae* Wheeler, 1928: 9, nomen nudum); Chapman and Capco, 1951: 127.

Myrmica ritae subsp. *formosae*: Weber, 1950: 220.

Myrmica formosae: Radchenko, 1994a: 44; Bolton, 1995: 279.

Myrmica margaritae var. *pulchella* Santschi, 1937: 368, w, Taiwan [Formosa], lectotype and paralectotypes in BASLE, studied; Weber, 1947: 219; Chapman and Capco, 1951: 127; Radchenko, 1994a: 44.

Myrmica margaritae subsp. *pulchella*: Bolton, 1995: 282, syn. nov.

Material examined: the lectotype worker (our designation), Funkika, Formosa, leg. Silvestri, and 9 paralectotype workers with same label; the lectotype of *M. margaritae* var. *pulchella* Sant together with 2 paralectotype workers on same pin, Musha, Formosa, leg. K. Sato.

Measurements and indices are given in Tables 1-3. *M. formosae* differs from all species of the *ritae*-complex except *M. margaritae* (see above for differences from this species) by the extremely coarse rugae on its head dorsum, the central frons having only four rugae. In addition, the dorsum of the head is without reticulate sculpture while the occipital margin, temples and genae have numerous outstanding hairs. Its head, alitrunk and pedicel are dark reddish, its mandibles and antennae are brownish-yellow and its genae and legs are whitish-yellow ("ivory yellow" according Wheeler's description). This species has been found only from Taiwan where its ecology is unknown.

Females and males are unknown.

We have no doubts that the lectotype and one paralectotype of *M. margaritae* var *pulchella* are the same species as the lectotype and paralectotypes of *M. formosae*. But one specimen (middle on the pin with lectotype of var. *pulchella*) is distinctly smaller than "normal" workers of both this variety and *M. formosae*. It has a finer sculpture on its head, the central frons having at least six fine rugae (Fig. 1, *10*) by which feature it resembles *M. serica*. Also, the sculpture of its petiole and particularly postpetiole, is finer; only the anterior and lower parts of lateral surfaces of the postpetiole are rugulose, the remainder being smooth. This small specimen is probably *M. serica* collected in error with the *M. formosae* but alternatively, *M. formosae* (and perhaps some other species of the *ritae* group) might be polymorphic, with smaller specimens being morphologically quite different from larger ones. However, although the latter situation is common among many ant genera it is unknown for *Myrmica*, and we have no evidence for polymorphism from other quite numerous series from the *ritae* group.

4. *Myrmica serica* Wheeler, 1928 (Fig. 2, *1-8*)

Myrmica margaritae var. *serica* Wheeler, 1928: 8, w, China, holotype in MCZ, studied; Weber, 1950: 223, f; Chapman and Capco, 1951: 127.

Myrmica serica: Radchenko, 1994a: 44; Bolton, 1995: 283.

Material examined: holotype worker, [China], Yunnanfu, leg. Silvestri; 5 workers, Arisan, Southern Taiwan, 20.10.1977, leg. K. Yamauchi; 4 workers, 5 males (including androtype, SIZK, ELMES), Mt. Hou-hoa-shan, Central Taiwan, 22.08.1995, leg. K. Onoyama; 2 workers, 1 female (dealate), China, Shanxi, 110 06' E, 34 27' N, Qin Ling Shan, Hua Shan, 118 km E. Xian, 1200–1400 m, No 958, 18–20.08.1996, leg. Wrase.

Measurements and indices are given in Tables 1–3. This is the first report of males from any of the *ritae* group species. The sculpture of the head dorsum of the workers is not as coarse as in *M. formosae* and *M. margaritae*, the central frons having at least six rugae similar to *M. indica, M. gigantea, M. urbanii* and *M. rigatoi*. Workers

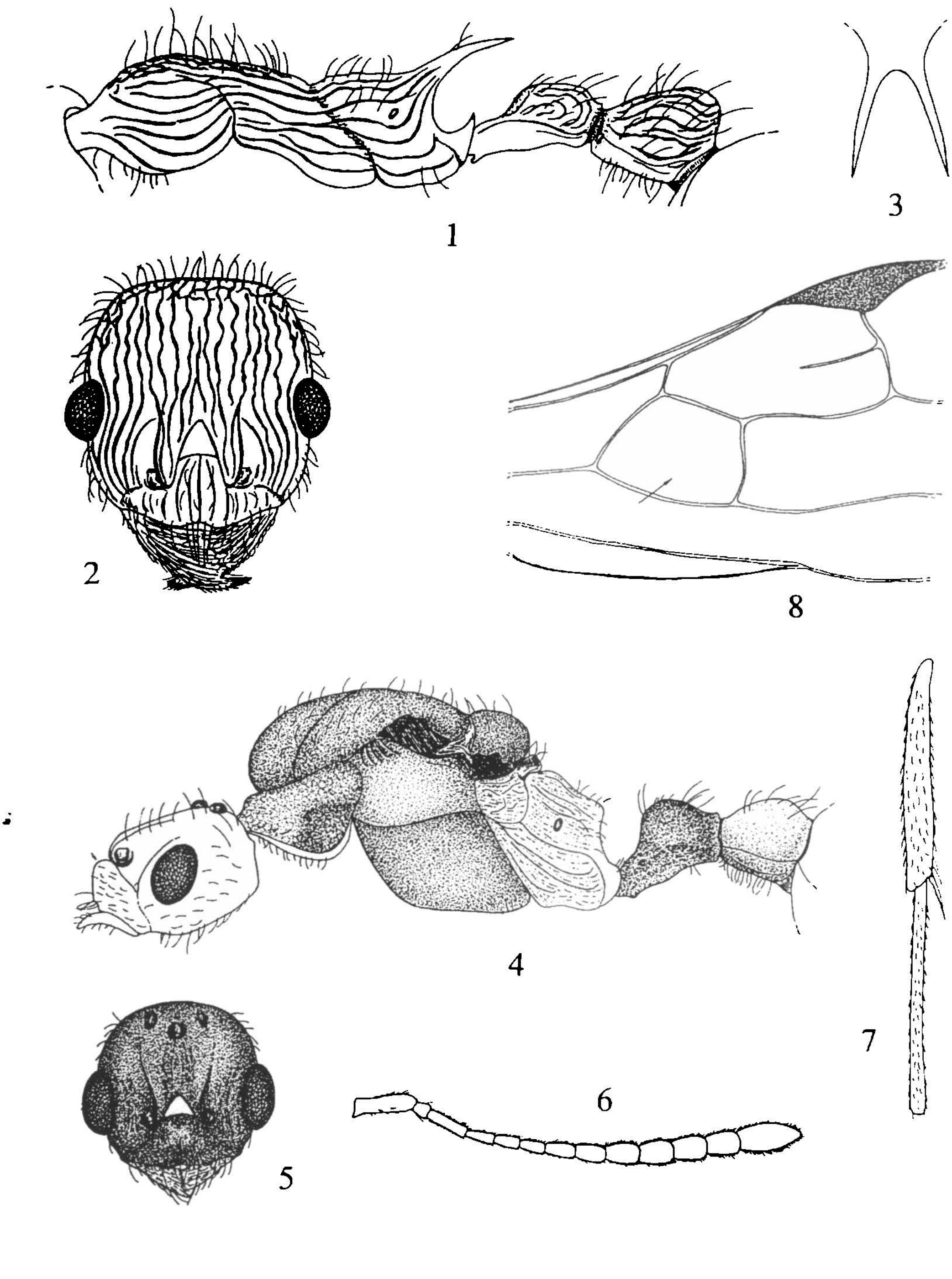


Fig. 2. *M. serica* holotype worker (1–3) and androtype male (4–8). 1 — alitrunk, petiole and postpetiole in profile; 2, 5 — head, frontal view; 3 — propodeal spine from above; 4 — head, alitrunk, petiole and postpetiole in profile; 6 — antenna; 7 — hind tibia and first tarsal segment; 8 — part of forewing with discoidal and cubital cells.

Рис. 2. *M. serica*, рабочий , голотип (1–3) и самец, андротип (4–8). 1 — грудь, петиолюс и постпетиолюс в профиль; 2, 5 — голова спереди; 3 — шипы проподеума сверху; 4 — голова, грудь, петиолюс и постпетиолюс в профиль; 6 — антенна; 7 — задняя голень и первый членик лапок; 8 — часть переднего крыла с дискоидальной и кубитальной ячейками.

differ from those of *M. indica* by the abundant outstanding hairs on the occipital margin of their head, temples and genae, from *M. gigantea* and *M. urbanii* by the absence of coarse reticulate sculpture on upper third of their head dorsum, and from *M. rigatoi* by it notched anterior clypeal margin. Their colour varies from dark reddish-brown (in holotype) to dark brown; the legs are brownish-yellow and the antennal scape brownish-red. *M. serica* females differ from those of *M. indica* by their abundant outstanding hairs on the occipital margin of the head, temples and genae, and from *M. gigantea* by the much greater size of that species (Table 1). *M. serica* is distributed in south and southwest China and Taiwan. Little is known of its ecology except that one colony in Taiwan was collected from under a stone in grassland (K. Onoyama. *pers. comm.*)

First description of males. The head is slightly longer than broad (CI 1.04–1.08) with convex sides, a slightly convex occipital margin and marked occipital corners. The central part of clypeus is sharply raised, forming trapezoid lobe-like process when seen in profile, and the anterior clypeal margin is straight but shallowly notched medially. Eyes are large and are located at the mid point of the sides of the head. The frontal carinae are straight. The antennal scape is short and straight, being shorter than sum of second and third funicular joints and not curved at the base (SI1 0.35–0.49). The antennal club is 5-jointed and the masticatory margin of mandibles are distinct, with 5–6 teeth.

The alitrunk is relatively long (AI 1.47–1.65) and wide, and the scutellum does not project dorsally above the scutum when seen in profile. The propodeum has blunt triangular teeth. The metapleural lobes are not prominent, but are sharply angulate at the apex. The petiole is relatively long (PI2 1.46–1.78) with a distinct anterior peduncle; its anterior surface slightly convex with a dorsally rounded node. The postpetiole is relatively long and low (PPI1 1.04–1.11) with its anterior and dorsal surfaces forming a more or less regular but asymmetric arch with an apex distinctly posterior of the centre.

The forewing is long (WI1 7.4–8.1; WI2 3.2–3.5) and generally the venation is typical for genus *Myrmica* except for the shape of the discoidal cell which is more similar to species of *Manica.* In other *Myrmica* species the cell is relatively narrow and subrectangular (length/width > 1.60) but in *M serica* it is relatively wide and trapezoidal (length/width < 1.55).

The head sculpture is generally fine with only the central part of the frons having a few longitudinal striae. The mandibles are densely longitudinally striate but the clypeus is finely punctured while the rest of head dorsum is densely and coarsely punctured. The scutellum is punctured whereas the scutum has short irregular striations and punctures and the propodeal dorsum is coarsely rugulose basally, punctured and dull in appearance. The sides of the alitrunk are finely and densely punctured; the propodeum has some longitudinal rugae but some parts of the mesopleurae are more or less smooth and shiny. Generally the petiole and postpetiole appear dull being densely punctured, but the central part of postpetiolar dorsum area appears shiny being finely and superficially punctured. The gaster is smooth and shiny. The occipital margin of head, temples and genae have outstanding hairs, although they are sparse on the genae, and the alitrunk, petiole, postpetiole and gaster have similar sparse hairs. The legs and antennal scape have short, straight, sparse, subdecumbent hairs. The body is blackish-brown in colour and the legs are brown. Measurements are given in Tables 1–2.

Table 1. Measurements (mm) of the type specimens of *ritae*-group, codes for measurements made as in the text. In addition to those shown, the androtypes of *M. serica* and *M. indica* had forewings which were 6.2 and 5.4 mm long and 1.9 and 1.8 mm wide respectively. The source is the museum (see text) which currently holds the type specimen.

Таблица 1. Промеры (в мм) голотипов и лектотипов видов группы ritae (сокращения названий промеров, а также Музеев, где хранятся типы, приведены в тексте). В дополнение к данным таблицы: длина передних крыльев андротипов M. serica и M. indica равна соответственно 6,2 и 5,4 мм, а их ширина - 1,9 и 1,8 мм.

Species	sex	Type	Source	HW	HL	FW	FLW	SL	PNW	SCL	PW	PPW	PH	PPH	PL	PPL	ESL	ESD	HTL	AL	AH
M. ritae	w	Lectotypus	MCSNG	1.20	1.34	0.40	0.46	1.61	0.91		0.29	0.46	0.34	0.53	0.65	0.50	0.79	0.72	1.34	1.97	
M. margaritae	w	Lectotypus	MCSNG	1.18	1.30	0.43	0.48	1.53	0.93		0.28	0.44	0.33	0.45	0.68	0.51	0.78	0.68	1.30	1.91	
M. formosae	w	Lectotypus	MCZ	1.22	1.36	0.47	0.50	1.63	0.89		0.34	0.53	0.38	0.51	0.82	0.56	0.72	0.61	1.44	2.18	
M. serica	w	Holotypus	MCZ	1.28	1.40	0.47	0.49	1.63	0.91		0.30	0.46	0.37	0.50	0.71	0.58	0.67	0.54	1.38	2.06	
M. indica	w	Lectotypus	MCZ	1.01	1.22	0.42	0.47	1.30	0.72		0.29	0.43	0.35	0.45	0.66	0.46	0.65	0.51	1.15	1.82	
M. gigantea	w	Holotypus	STOCK	1.62	1.88	0.64	0.74	1.70	1.06		0.34	0.48	0.48	0.54	0.72	0.54	0.56	0.54	1.70	2.58	
M. urbanii	w	Holotypus	BMNH	1.30	1.46	0.48	0.50	1.61	0.97		0.32	0.51	0.38	0.58	0.71	0.45	0.80	0.66	1.42	2.26	
M. boltoni	w	Holotypus	BMNH	1.20	1.42	0.48	0.51	1.46	0.87		0.33	0.49	0.37	0.49	0.62	0.44	0.64	0.61	1.30	2.15	
M. martensi	w	Holotypus	NHMB	1.09	1.25	0.45	0.48	1.22	0.78		0.29	0.46	0.39	0.46	0.63	0.46	0.48	0.60	1.15	1.88	
M. collingwoodi	w	Holotypus	NHMB	1.03	1.24	0.44	0.47	1.20	0.72		0.28	0.43	0.33	0.45	0.58	0.40	0.73	0.56	1.05	1.79	
M. rigatoi	w	Holotypus	RIGATO	0.88	1.14	0.36	0.42	1.12	0.64		0.27	0.38	0.34	0.42	0.56	0.42	0.46	0.44	1.02	1.64	
M. serica	♂	Androtypus	SIZK	0.81	0.88	0.25	0.35	0.31	1.09	1.47	0.31	0.45	0.40	0.45	0.59	0.49			1.25	2.10	1.29
M. indica	♂	Androtypus	MARTENS	0.67	0.81	0.20	0.28	0.39	0.96	1.18	0.38	0.38	0.32	0.36	0.58	0.38			1.16	1.80	1.28
M. serica	♀	Gynetypus	SCHULTZ	1.32	1.54	0.52	0.55	1.56	1.20	1.80	0.42	0.68	0.50	0.69	0.92	0.64	0.78	0.76	1.44	2.56	1.58
M. indica	♀	Gynetypus	NHMB	1.19	1.37	0.52	0.54	1.51	1.12	1.65	0.39	0.62	0.50	0.64	0.78	0.55	0.53	0.60	1.18	2.52	1.58
M. gigantea	♀	Gynetypus	STOCK	1.94	2.18	0.80	0.90	1.96	1.36	2.18	0.56	0.70	0.66	0.70	1.20	0.80	0.60	0.82	1.98	3.32	2.04
M. martensi	♀	Gynetypus	NHMB	1.12	1.26	0.46	0.49	1.23	0.95	1.39	0.36	0.59	0.48	0.56	0.73	0.53	0.53	0.68	1.25	2.17	1.37
M. collingwoodi	♀	Gynetypus	NHMB	1.25	1.36	0.50	0.52	1.33	1.06	1.65	0.37	0.60	0.48	0.62	0.73	0.55	0.77	0.64	1.32	2.39	1.64

5. ***Myrmica indica*** Weber, 1950 (Fig. 3, *1-6*)

Myrmica ritae subsp. *indica* Weber, 1950: 221, w, India, lectotype and paralectotype in MCZ.
Myrmica indica: Radchenko, 1994a: 44; Bolton, 1995: 279.

Material examined: the lectotype worker (our designation) from Tonglu, Darjiling distr., E. Himalayas, 10, 000 ft., 22.04.[19]10, leg. C.W. Beebe; 1 worker, paralectotype with same label (MCZ). Also, a single female and series of previously unidentified workers (BASLE): 3 workers, Nepal, Chordung, Jiri, 2900 m, 1.04.1973, leg. J. Martens; 15 workers, Nepal, Thodung, 2–9.04.1973, leg. J. Martens; 1 worker, Nepal, Shiralaybis, Jiri-grat, 2200 m, 8.06.1973, leg. J. Martens; 9 workers, Nepal, Jiri-Thodung, 28.05.1976, leg. W. Wittmer and C. Baroni Urbani; 12 workers, 1 female (gynetype), Nepal, Phulchoki, 2600 m, 11-14.06.1976, leg. W. Wittmer and C. Baroni Urbani; 10 workers, Bhutan, Thimphu, 31.05, Nat.-Hist. Museum NHMB — Bhutan Expedition, 1972; 10 workers, Bhutan, Sampa-Kotoka, 1400–2600 m, 9.06, Nat.-Hist. Museum NHMB — Bhutan Expedition, 1972; 3 workers, Bhutan, Nobding, 41 km O Wangdi, 2800 m, Nat.-Hist. Museum NHMB — Bhutan Expedition, 1972; Darjeling Distr., India, Tiger Hill, 2500 m, 27.05.1975, leg. W. Wittmer; 1 worker, Zentral-Nepal, Zw. Tare-Pati, u. Gasaikunde, Sept. — Okt. 1971, leg. H. Franz. 2 workers, Nepal-364, Prov. Taplejung, Simbua Khola, vic. Lassetham, 3000–3150 m, 15.05.1988, leg. J. Martens and W. Schawaller; 2 workers and 2 males (incl. androtype), Nepal-404, Prov. Sankhua, Sabha, vic. Phakhola, 31–05.–03.06. 1988, 2600–2800 m, leg. J. Martens and W. Schwaller.

Measurements and indices are given in Tables 1–3. The head and body of workers and females, varies from dark brown to black, and the legs and antennal scapes are dark reddish-brown. By sculpture of the head dorsum, workers and females of *M. indica* resemble *M. serica*, but they clearly differ from this species by sparse outstanding pilosity on the occipital margin of the head, an absence of hairs on the genae and by straight propodeal spines. Workers differ from *M. urbanii* and *M. gigantea* by an absense of coarse reticulate sculpture on the rear third of the head dorsum and from *M. rigatoi* by the absence of a notch in the anterior margin of their clypeus. Females differ from *M. gigantea* by the much greater size of the latter (Table 1). Males of *M. indica* clearly differ from those of *M. serica* by their relatively longer heads and antennal scapes, and by a quite different sculpture of the alitrunk (see Figs. 2, *4–5* and 3, *7–8*).This species is associated with the high Himalaya, but otherwise its ecology is unknown.

First description of female (dealate). The head is subrectangular with somewhat convex sides, slightly convex occipital margin and more or less rounded occipital corners; its upper latero-ventral corners are distinctly pointed or dentiform (seen in profile). The anterior clypeal margin is straight but shallowly notched medially. The frontal carinae are almost straight or only very feebly curved, they do not curve outwards to merge into the rugae which surround antennal sockets. The frons is wide and the eyes are oval and convex, and are placed distinctly anterior of the mid point of the sides of the head. Antennal scapes are distinctly longer than the head and are gradually and weakly curved at their base; the funicular joints distinctly longer than broad; the apical club is 4-jointed.

The alitrunk is relatively long and narrow; the metapleural lobes are narrowly rounded at the apex and do not form a sharp tooth. The propodeal spines are long, projecting backwards and being curved downwards and towards each other. The petiole is long, low and narrow but relatively less so than in the workers, the anterior peduncle is long having a concave anterior surface, and the node is distinctly convex dorsally. The postpetiole is high, short and narrow; its anterior surface is more or less straight and appears to form a relatively long, dorsally flattened plate.

Generally the specimen is coarsely rugose with the surface between rugae being smooth and shiny. The rugae of the head dorsum are very coarse with only five rugae on the cental frons; the rugae are straight on the frons but sinuous on other parts of the head. The clypeus is coarsely rugose, the mandibles coarsely striato-rugulose and the frontal area smooth and shiny. The pronotum, scutum and scutellum have very coarse sinuous rugae with the sides of alitrunk and propodeum having similar straight

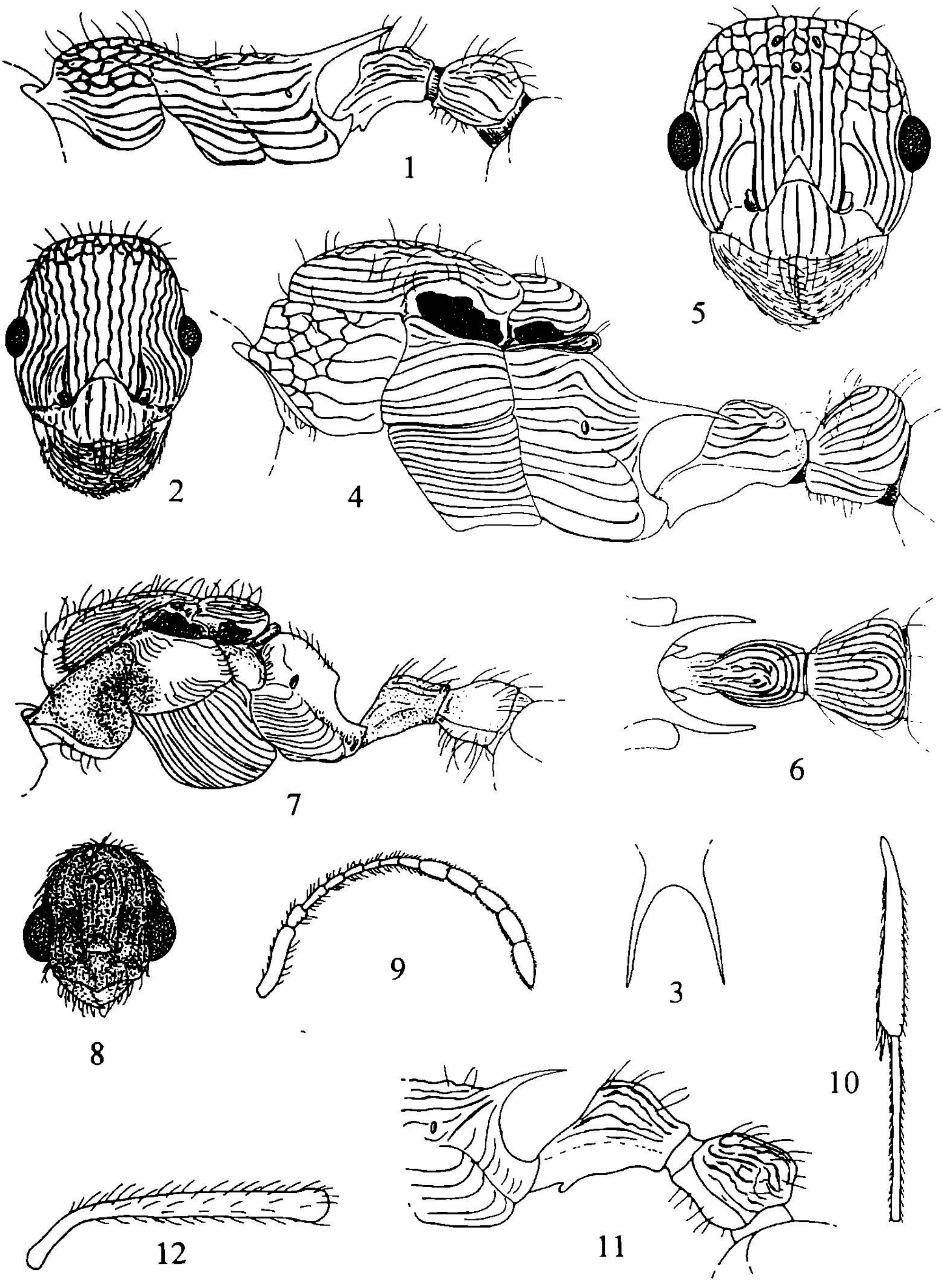


Fig. 3. *M. indica* lectotype worker (1–3), gynetype female (4–6) and androtype male (7–10); *M. gigantea* holotype worker (11, 12). 1, 4, 7 — alitrunk, petiole and postpetiole in profile; 2, 5, 8 — head, frontal view; 3 — propodeal spine from above; 6 — propodeal spine, petiole and postpetiole from above; 9 — antenna, 10 — hind tibia and first segment of the tarsus; 11 — propodeal spine, petiole and postpetiole in profile; 12 — antennal scape in profile.

Рис. 3. *M. indica*, рабочий, лектотип (1–3), самка, гинетип (4–6) и самец, андротип (7–10); *M. gigantea*, рабочий, голотип (11, 12). 1, 4, 7 — грудь, петиолюс и постпетиолюс в профиль; 2, 5, 8 — голова спереди; 3 — шипы проподеума сверху; 6 — шипы проподеума: петиолюс и постпетиолюс сверху; 9 — антенна; 10 — задняя голень и первый членик лапок; 11 — шипы проподеума, петиолюс и постпетиолюс в профиль; 12 — скапус антенны в профиль.

ones. The petiole and postpetiole are coarsely rugose but the surface between the propodeal spines is smooth and shiny. The gaster is smooth and shiny, with only very superficial fine reticulation.

Generally it has few hairs; the occipital margin of the head having a few straight outstanding hairs but none on the temples and genae, while the dorsum of the alitrunk, petiole, postpetiole and gaster have slightly curved, sparse hairs. The tibiae and antennal scapes have numerous suberect hairs. A very sparse, short, decumbent pilosity is present only on the gaster. Its general colour is dark brown to black with dark reddish-brown legs and parts the alitrunk and pedicel sides. Measurements are given in Table 1.

First description of males. The head is distinctly longer than broad (CI 1.21−1.22) with slightly convex sides and occipital margin, and rounded occipital corners. The central part of clypeus is sharply raised, forming trapezoid lobe-like process when seen in profile, and the anterior clypeal margin is sharply pointed, not notched medially. Eyes are large and are located somewhat lower than the mid point of the sides of the head. The frontal carinae are straight. The antennal scape is relatively short, being somewhat longer than sum of the second, third and fourth funicular joints (SI1 0.48−0.49), and weakly curved at the base. The antennal club is 5-jointed and the masticatory margin of mandibles are distinct, with 4 quite large teeth.

The alitrunk is relatively long (AI 1.41−1.47) and wide, and the scutellum does not project dorsally above the scutum when seen in profile. The propodeum has blunt triangular teeth. The metapleural lobes are not prominent, but are sharply angulate at the apex. The petiole is long (PI2 1.71−1.81) with a distinct anterior peduncle; its anterior surface is almost straight with a dorsally rounded node. The postpetiole is long and low (PPI1 1.05−1.06) with its anterior and dorsal surfaces forming a more or less regular, flattened arc. The forewing is long (WI1 8.1−8.2) and generally the venation is typical for genus *Myrmica*, including the shape of the discoidal cell.

The head sculpture is generally fine with only the central part of the frons and sides of head having a few longitudinal striae. The mandibles are very finely, longitudinally striate but the clypeus is finely punctured while the rest of head dorsum is densely and coarsely punctured. The scutellum and back part of the scutum is finely longitudinally rugulose, the rest of the scutum is smooth and shiny; the propodeal dorsum is very finely punctured. The sides of the pronotum are finely punctured; the lower parts of the mesopleurae and upper side of the propodeum have short and sparse rugae, appearing smooth and shiny. The lower parts of the mesopleurae are distinctly rugulose, but the surface between the rugae is smooth and shiny. The sides of the petiole have a few longitudinal rugae and are very finely punctured; the petiole node from above, the postpetiole and gaster are smooth and shiny.

The occipital margin of head, temples and genae have long outstanding hairs, and the alitrunk, petiole, postpetiole and gaster have even longer hairs. The legs and antennal scape have short, straight, subdecumbent hairs. The body and appendages are reddish-brown but the head dorsum is somewhat darker. Measurements are given in Tables 1- 2.

6. ***Myrmica gigantea*** (Collingwood, 1962), comb. et stat. nov. (Fig. 3, *11, 12*)

Aphaenogaster gigantea Collingwood, 1962: 225w, f, Burma, holotype and paratype in STOCK, studied; Bolton, 1995: 279.

Myrmica ritae: Collingwood, 1970: 374, nec Emery, 1889 et auct.

Measurements and indices are given in Tables 1−3. *Myrmica gigantea* was originally described as an *Aphaenogaster*, but later Collingwood (1970) placed it in *Myrmica* and synonymised it with *M. ritae*. Study of types of both these species showed *M. gigantea* to be a distinct species. Apart from the unusually large size of both the worker and female (Table 1), it is similar by head sculpture and by pilosity to *M. urbanii* (see

Table 2. The mean, standard deviation, minimum and maximum values (mm) of the measurements made on samples of specimens from the *ritae*-group. The measurements codes are as indicated in the text and the number of individuals measured are given in parenthesis. In the case of males the scutum width (SCW) is given as PNW.

Таблица 2. Промеры (в мм) видов группы *ritae* (средние, стандартное отклонение, минимальные и максимальные). Сокращения как в Таблицу 1; количество измеренных экземпляров дано в скобках после названий видов. Для самцов в графе "PNW" даны промеры SCW.

Measur	*M. ritae* (4)		*M. formosae* (8)		*M. serica* (13)		*M. indica* (17)		*M. urbanii* (21)	
	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max
HW	1.15±0.050	1.06–1.20	1.19±0.048	1.11–1.26	1.20±0.050	1.10–1.36	1.15±0.108	0.95–1.34	1.27±0.061	1.09–1.32
HL	1.30±0.057	1.20–1.34	1.37±0.047	1.32–1.42	1.35 ±0.057	1.26–1.54	1.32±0.102	1.13–1.51	1.45±0.064	1.26–1.53
FW	0.38±0.018	0.36–0.41	0.47±0.022	0.43–0.49	0.47±0.018	0.44–0.53	0.47±0.037	0.41–0.54	0.48±0.021	0.41–0.51
FLW	0.43±0.019	0.40–0.46	0.50±0.022	0.47–0.53	0.49±0.019	0.46–0.54	0.50±0.037	0.43–0.58	0.51±0.024	0.43–0.54
SL	1.53±0.070	1.40–1.61	1.60±0.064	1.51–1.71	1.42±0.070	1.30–1.64	1.37±0.116	1.11–1.55	1.57±0.058	1.42–1.63
PNW	0.85±0.039	0.79–0.91	0.90±0.022	0.89–0.95	0.87±0.039	0.80–1.00	0.85±0.081	0.72–1.01	0.94±0.045	0.78–0.99
PW	0.27±0.024	0.23–0.31	0.34±0.017	0.31–0.36	0.30±0.024	0.28–0.34	0.32±0.042	0.24–0.40	0.31±0.016	0.28–0.34
PPW	0.45±0.024	0.42–0.49	0.52±0.020	0.49–0.55	0.46±0.024	0.40–0.53	0.47±0.050	0.37–0.54	0.49±0.024	0.42–0.52
PH	0.35±0.011	0.33–0.36	0.37±0.019	0.35–0.40	0.37±0.011	0.34–0.40	0.36±0.039	0.028–0.43	0.37±0.021	0.32–0.41
PPH	0.51±0.030	0.46–0.55	0.51± 0.016	0.48–0.53	0.50±0.030	0.45–0.60	0.49±0.057	0.037–0.56	0.57±0.030	0.48–0.60
PL	0.61±0.037	0.56–0.65	0.78±0.036	0.74–0.83	0.66±0.037	0.62–0.71	0.65±0.059	0.50–0.72	0.67±0.038	0.56–0.71
PPL	0.48±0.054	0.42–0.57	0.57±0.021	0.55–0.61	0.49±0.054	0.41–0.58	0.43±0.040	0.35–0.50	0.45±0.036	0.38–0.51
ESL	0.77±0.059	0.66–0.82	0.73±0.067	0.61–0.82	0.66±0.059	0.56–0.86	0.68±0.065	0.58–0.82	0.76±0.052	0.61–0.89
ESD	0.63±0.101	0.51–0.81	0.61±0.049	0.52–0.68	0.56±0.101	0.46–0.63	0.59±0.079	0.47–0.76	0.62±0.052	0.53–0.73
AL	1.98±0.036	1.96–2.06	2.15±0.131	1.97–2.32	2.00±0.036	1.88–2.32	1.96±0.166	1.56–2.21	2.26±0.094	1.97–2.38
HTL	1.29±0.064	1.16–1.34	1.41±0.057	1.34–1.51	1.19±0.064	1.06–1.42	1.23±0.122	0.97–1.40	1.37±0.055	1.22–1.42

Table 2 (cont).

Measur	*M. boltoni* (15)		*M. martensi* (3)		*M. collingwoodi* (15)		*M. serica* males (4)		*M. indica* males (2)	
	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean±SD	Min–Max	Mean	Min–Max
HW	1.10±0.063	0.97–1.20	1.01±0.013	0.95–1.09	1.03±0.047	0.93–1.09	0.84±0.033	0.81–0.88	0.67	0.67–0.67
HL	1.33±0.061	1.20–1.42	1.19±0.058	1.14–1.25	1.23±0.047	1.13–1.32	0.90±0.039	0.86–0.94	0.81	0.81–0.82
FW	0.44±0.028	0.40–0.49	0.43±0.021	0.41–0.45	0.44±0.019	0.40–0.47	0.24±0.014	0.22–0.25	0.20	0.20–0.20
FLW	0.47±0.028	0.42–0.51	0.46±0.026	0.43–0.48	0.46±0.023	0.42–0.50	0.34±0.013	0.32–0.35	0.28	0.28–0.28
SL	1.38±0.056	1.28–1.46	1.16±0.051	1.12–1.22	1.22±0.045	1.11–1.30	0.38±0.079	0.31–0.46	0.39	0.39–0.40
PNW	0.80±0.044	0.72–0.87	0.73±0.047	0.69–0.78	0.74±0.031	0.65–0.78	1.11±0.059	1.04–1.16	0.97	0.96–0.98
PW	0.29±0.021	0.26–0.33	0.27±0.018	0.25–0.29	0.28±0.014	0.24–0.30	0.29±0.025	0.26–0.31	0.34	0.30–0.38
PPW	0.47±0.019	0.44–0.50	0.42±0.043	0.38–0.46	0.43±0.020	0.39–0.47	0.45±0.025	0.42–0.48	0.38	0.38–0.38
PH	0.35±0.017	0.32–0.38	0.36±0.025	0.34–0.39	0.33±0.021	0.30–0.37	0.39±0.022	0.36–0.41	0.32	0.32–0.34
PPH	0.50±0.021	0.46–0.53	0.44±0.025	0.41–0.46	0.46±0.034	0.41–0.51	0.45±0.006	0.44–0.45	0.36	0.36–0.38
PL	0.59±0.047	0.53–0.70	0.59±0.037	0.56–0.63	0.55±0.025	0.50–0.58	0.64±0.039	0.59–0.68	0.58	0.58–0.58
PPL	0.40±0.024	0.37–0.45	0.43±0.024	0.42–0.46	0.39±0.015	0.38–0.43	0.48±0.021	0.46–0.50	0.38	0.38–0.40
ESL	0.60±0.026	0.54–0.64	0.46±0.016	0.45–0.48	0.69±0.040	0.60–0.74				
ESD	0.54±0.057	0.45–0.66	0.59±0.014	0.57–0.60	0.64±0.071	0.51–0.77				
AL	1.98±0.112	1.82–2.15	1.80±0.071	1.74–1.88	1.74±0.068	1.62–1.85	2.12±0.108	1.98–2.24	1.78	1.76–1.80
HTL	1.25 ±0.058	1.15–1.36	1.08±0.088	1.01–1.18	1.05±0.040	0.99–1.11	1.28±0.065	1.20–1.34	1.16	1.16–1.16
AH							1.35±0.116	1.26–1.52	1.24	1.20–1.28
SCW							1.11±0.059	1.04–1.16	0.97	0.96–0.98
SCL							1.51±0.079	1.42–1.60	1.20	1.18–1.22
WL							6.44±0.433	6.15–7.12	5.48	5.44–5.52
WB							1.93±0.121	1.76–2.08	1.80	1.76–1.84

below) from which it differs by having in relation to its large size, distinctly shorter propodeal spines, a shorter petiolar dorsum, shorter antennal scapes which are somewhat strongly curved at the base, and a lighter colour. The female of *M. gigantea* is exceptionally large and is bigger than all known females of *Myrmica*. It is found in Burma where its ecology is unknown.

7. ***Myrmica urbanii*** sp. nov. (Fig. 4, *1–5*)

Material examined: holotype worker, India, Shillong, Mawphlang, East Khasi, 3200 ft., 2.05.[19]86, leg. V. Darlong (deposited in BMNH). Paratypes: 86 workers from the same nest as holotype; 2 workers, [India], Mawphlang, Megalaya, 1850 m, 15.05.1976, leg. Wittmer, Baroni U[rbani]; 6 workers, Upper Shillong, Megalaya, 1900 m, 13.05.1976, leg. Wittmer, Baroni U[rbani]; 3 workers, Cherranukh, India, 1961, leg. Korovin (BMNH, ELMES, BASLE, SIZK, ZMMU).

Workers. The head is subrectangular with convex sides, a straight occipital margin and narrowly rounded occipital corners; the upper latero-ventral corners are distinctly pointed or dentiform (seen in profile). The anterior clypeal margin is straight but is distinctly notched medially. The frontal carinae are more or less straight or only very feebly curved, and do not curve outwards to merge into the rugae which surround the antennal sockets. The frons is wide and the eyes are convex and oval, being located slightly anteriorly of the mid point of the sides of the head. The antennal scapes are longer than head and are gradually and weakly curved at their base; the funicular joints are distinctly longer than broad; the apical club is 4-jointed.

The alitrunk is long and low with a more or less flattened, convex promesonotum; the promesonotal suture is distinct and the mesopropodeal furrow is distinct and deep. The metapleural lobes project apically forming a sharp tooth. The propodeal spines are very long, projecting backwards, slightly upwards and diverging slightly, but being straight or slightly curved downwards on their distal half. The petiolar node is long, low and narrow, being longer than anterior peduncle, with a flattened and horizontal dorsum. The postpetiole has an inclined, slightly concave anterior surface, and broadly rounded dorsum with a relatively small node.

The gaster is smooth and shiny and the body is generally rugose with the surfaces between rugae being smooth and shiny, not punctured. The head dorsum is very coarsely rugose but the frons is sinuously rugose, with the central frons having not less than six rugae. The upper, rear third of the head dorsum has a distinct coarse reticulate sculpture. The clypeus is coarsely rugose and the mandibles are coarsely striato-rugulose while the frontal area is smooth and shiny. The alitrunk is generally coarsely, sinuously rugose but its dorsum also has coarse reticulation. Both the petiole and postpetiole have coarse longitudinal rugae.

It is a pilous species with the occipital margin and sides of head, the dorsum of alitrunk, the petiole, postpetiole and gaster having very abundant, long, outstanding hairs. The legs and antennal scapes have subdecumbent hairs. Also, a very sparse, short, decumbent pilosity is presents only on the gaster. The alitrunk and dorsum of head is a dark reddish-brown colour, the ventral surface of the head is reddish, the petiole and postpetiole yellowish-brown or light reddish-brown and the legs and antennae dark yellow. The gaster and propodeal spines are testaceous. Measurements and indices are given in Tables 1–3.

Notes. Females and males are unknown. This species is closely related to *M. indica* and especially to *M. serica*. However, it clearly differs from *M. indica* by having many more outstanding hairs on its head, and by a distinctly lighter colour of legs, antennae and gaster. It differs from both *M. serica* and *M. indica* by its coarse reticulate sculpture of the rear third of head dorsum, from *M. margaritae* and *M. formosae* by its less coarsely sculptured head and the central frons having not less than six rugae, from *M. ritae* by the sinuosity of its rugae and the reticulation of the head dorsum, from *M. rigatoi* by its notched anterior clypeal margin and from *M. gigantea* by its dis

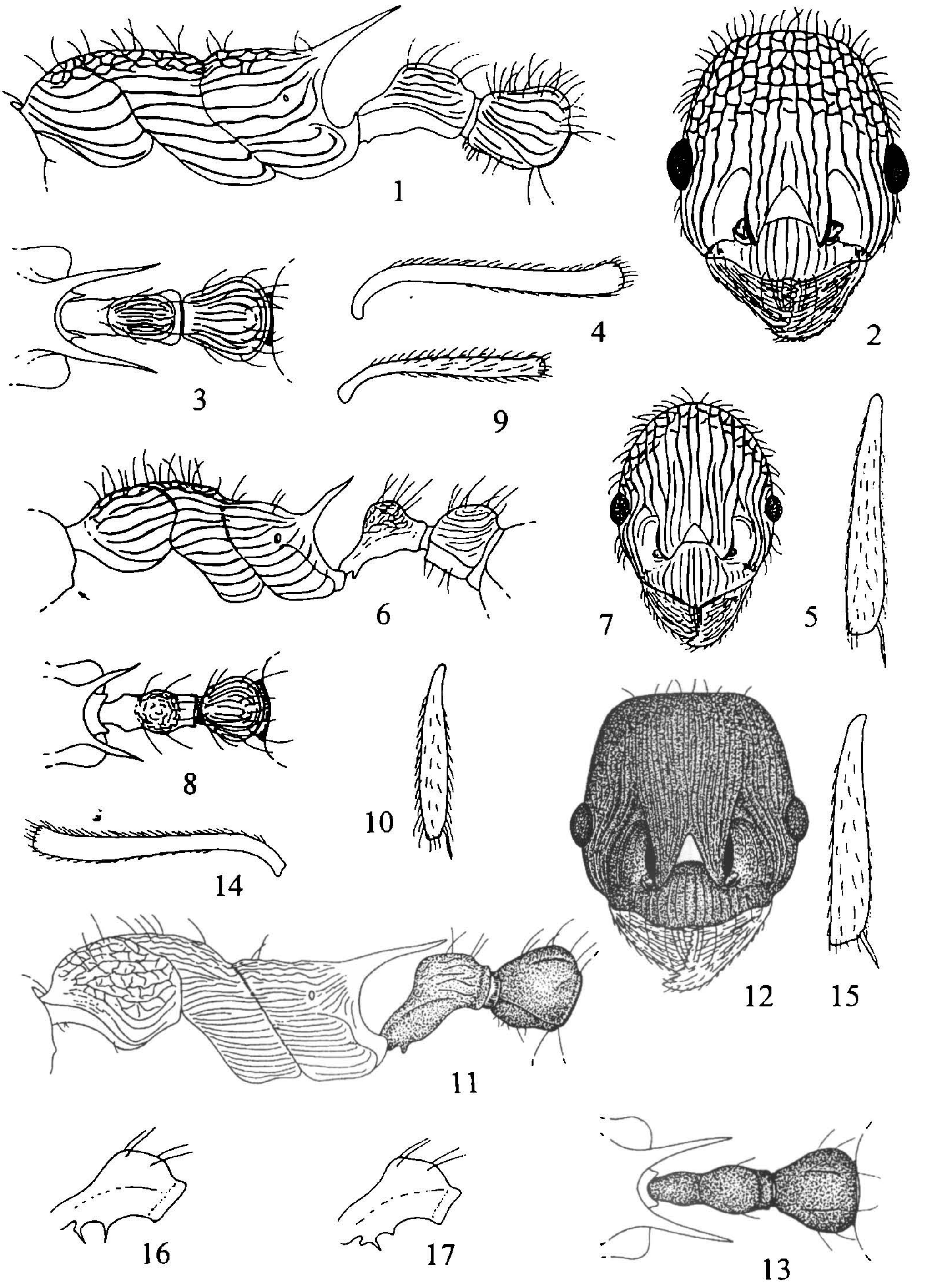


Fig. 4. *M. urbanii* holotype worker (1–5); *M. rigatoi* holotype worker (6–10); *M. boltoni* holotype worker (11–15) and paratype workers (16, 17). 1, 6, 11 — alitrunk, petiole and postpetiole in profile; 2, 7, 12 — head, frontal view; 3, 8, 13 — propodeal spine, petiole and postpetiole from above; 4, 9, 14 — antennal scape in profile; 5, 10, 15 — hind tibia; 16, 17 — petiole in profile.

Рис. 4. M. *urbanii*, рабочий, голотип (1–5); *M. rigatoi*, рабочий, голотип (6–10); *M. boltoni*, рабочий, голотип (11–15) и паратипы (16, 17).1, 6, 11 — грудь, петиолюс и постпетиолюс в профиль; 2, 7, 12 — голова спереди; 3, 8, 13 — шипы проподеума, петиолюс и постпетиолюс сверху; 4, 9, 14 — скапус антенн в профиль; 5, 10, 15 — задние голени; 16, 17 — петиолюс в профиль.

tinctly longer propodeal spines, longer petiolar dorsum, its relatively longer scapes which are weakly curved at the base, and by its darker colour. Little is known about the ecology of *M. urbanii* other than one nest was found living in soil beneath a log in Quercus forest.

8. *Myrmica rigatoi* sp. nov. (Fig. 4, *6–10*)

Material examined: holotype worker, Pakistan, Changla Gali (between Marree and Nathia Gali), 2200 m, 16.08.1994, leg. S. Dakatra (RIGATO).

Holotype worker. The head is elongate with convex sides and occipital margin; the occipital corners are not marked but are very broadly rounded; the upper latero-ventral corners are distinctly pointed (seen in profile). The anterior clypeal margin is prominent but not pointed, being narrowly rounded, and is not notched medially. The frontal carinae are weakly curved but do not curve outwards and do not merge into the rugae which surround antennal sockets. The frons is wide and the eyes are ovale and convex, being situated more or less on the mid point of the sides of the head. The antennal scape are somewhat shorter than the head, being gradually and weakly curved at their bases; the funicular joints distinctly longer than broad; the apical club is 4-jointed.

The alitrunk has a long, low, more or less flattened or feebly convex, promesonotum. The promesonotal suture is distinct and the mesopropodeal distinct, but shallow. The metapleural lobes are angulate but do not project apically to form a sharp tooth. The propodeal spines are long, projecting backwards and upwards, slightly curved upwards at their tips, and diverging slightly. The petiole is comparatively high (PI1 1.65), with a long and unusually thin anterior peduncle and a large or massive, node which is more or less square in profile. The postpetiole has an inclined and slightly convex anterior surface and a broadly rounded dorsum, with a relatively small node.

The head dorsum is very coarsely rugose, with the central frons having more than six rugae. The occiput and temples has a distinct coarsely reticulate sculpture; the clypeus is coarsely rugose; the mandibles are coarsely striato-rugulose but the frontal area is smooth and shiny. The sides of the alitrunk are coarsely longitudinally rugose and its dorsum has sinuous rugae and coarse reticulation. The petiolar node has short but not coarsely sinuous rugae and reticulation. The postpetiolar node has concentric longitudinal rugulosity. Generally the surfaces between rugae are smooth, not punctured, and appear shiny. The gaster is smooth and shiny.

The occipital margin and sides of head have very abundant, long and outstanding hairs; the dorsum of alitrunk, petiole and postpetiole and gaster have a similar pilosity. The antennal scapes have suberect hairs and those of the legs are subdecumbent. A very sparse, short, decumbent pilosity is present only on the gaster. The head dorsum and gaster are blackish brown, the alitrunk dark brown and the legs and antennae are light brown.

Notes. Females and males are unknown. Measurements and indices are given in Tables 1–3. *M. rigatoi* well differs from all another species of *ritae*-complex by its prominent but not medially notched anterior clypeal margin, by shape of its petiole and by the relatively finer sculpture of its petiolar and postpetiolar nodes. Its ecology is unknown.

9. *Myrmica boltoni* sp. nov. (Fig. 4, *11–17*).

Material examined: holotype worker, Nepal, Dhorpantan, 3000 m, 20.05.1973, leg. T. Martens (BASLE). Paratypes: 15 workers with same label (probably same nest) as holotype; 3 workers, Umg. Goropani, w. Pokhara, Zentral Nepal, Sept.-Oct. 1971, leg. H. Franz; 1 worker, Nepal, 2 mls. S.E. Sikha, 7800-8000 fts., 21-22.05.1954, leg. J. Quinlan ; 1 worker, Nepal, 18km NNE Baglung, 28°24' N, 83°42'E, 2540m.. 1 worker, Nepal-23, Prov. Kosi, Distr. Sankhuwasawa, Vallee d'Induwa Koa, 200 m, 16.04.1984, leg. Lobl and A. Smetana; 1 worker, Nepal-140, Prov. Manang, Marsyandi, 2550 m, 14-17-04. 1980, leg. J.

Martens and Ausobsky; 2 workers, Nepal-161, Prov. Mustang, Lethe, 2450-2600 m, 30.04.1980, leg. J. Martens and Ausobsky; 1 worker, Nepal-233, Prov. Gorkha, Chuing Khola, Meme Kharka, 3300-3400 m, leg. J. Martens and W. Schwaller (BASLE, BMNH, SIZK, ELMES, WARD, MARTENS, SCHULZ)

Workers. The head is subrectangular with somewhat convex sides, a straight or slightly convex occipital margin and well marked occipital corners; the upper latero-ventral corners are distinctly pointed or dentiform (seen in profile). The anterior clypeal margin is almost straight but distinctly notched medially. The frontal carinae are more or less straight or only very feebly curved, and do not curve outwards and do not merge into the rugae which surround antennal sockets. The frons is wide and the eyes are convex and oval, being located distinctly anteriorly of the mid point of the sides of the head. The antennal scapes are longer than the head and are gradually and weakly curved at their bases; the funicular joints are distinctly longer than broad; the apical club is 4-jointed.

The alitrunk has a long, low, slightly convex promesonotum; the promesonotal suture is distinct, the mesopropodeal furrow is also distinct but not very deep and abrupt. The metapleural lobes do not project into sharp tooth, but are narrowly rounded at their apex. The propodeal spines are very long, projecting posteriorly and are sub parallel to the dorsal surface of propodeum, and being slightly curved downwards and slightly divergent. The petiolar node is long, low and narrow, being somewhat longer than anterior peduncle, and having a flattened and slightly backwards sloping dorsum. The anterior and dorsal surfaces of postpetiole forming a more or less regular but asymmetric arch, with its apex distinctly posterior of the centre; the postpetiolar node is relatively small.

This ant is generally finely rugose with the surface between rugae being punctinate. The dorsum of the head has dense, fine, longitudinal rugulae with the surface between them being coarsely and densely punctured, appearing dull. The mandibles are densely striated and the clypeus has fine longitudinal carinae and is densely punctured, appearing dull, but the frontal area is smooth or only very finely and superficially punctured, and appears shiny. The alitrunk has dense, irregular, short, sinuous rugae and reticulation with only the mesopleurae and sides of the propodeum being longitudinally rugulose; the surface between these rugae is at most very finely and superficially punctured and appears shiny. The surface between the base of the propodeal spines is very finely striated transversally. Both the petiole and postpetiole are densely, coarsely punctured, appearing dull; the sides of petiolar node also has short sinuate striae. The gaster is smooth and shiny with very fine superficial reticulation.

The occipital margin of head has a few straight, outstanding hairs but there are none on the temples and genae; the dorsum of the alitrunk, petiole, postpetiole and gaster have similar sparse hairs. The legs have subdecumbent hairs but those of the antennal scape are suberect. A sparse, short decumbent pilosity is present only on the gaster, legs and antennal scape. The colour is generally dark reddish-brown to brownish-black.

Notes. Measurements and indices are given in Table 1. Females and males are unknown. *M. boltoni* differs from other members of the *ritae*-complex by the much finer rugosity on its body, and by the dull, dense and coarsely punctured surface of its head. Its ecology is unknown, but one worker was collected under rotten wood in a Quercus-Rhododendron forest (Ward, *pers. comm.*).

Table 3. The mean, minimum and maximum indices calculated from the measurements summarised in Table 2, the codes are as indicated in the text and the number of individuals measured are given in parenthesis. In three cases the type specimen was all the material available.

Таблица 3. Индексы, вычисленные на основе промеров видов группы *ritae* (средние, стандартное отклонение, минимальные и максимальные). Сокращение названий индексов приведены в тексте; количество измеренных экземпляров дано в скобках после названий видов. Для 3 видов приведены данные только для лектотипов или голотипов.

Index	*M. ritae* (4)		*M. margaritae*	*M. formosae* (8)		*M. serica* (9)		*M. indica* (17)		*M. gigantea*	*M. urbanii* (21)		*M. boltoni* (15)		*M. rigatoi*	*M. martensi* (3)		M. collingwoodi (15)	
	Mean	min–max	type	Mean	min–max	Mean	min–max	Mean	min–max	type	Mean	min–max	Mean	min–max	type	Mean	min–max	Mean	min–max
CI	1.12	109–1.14	1.11	1.15	1.07–1.21	1.13	1.10–1.16	1.15	1.10–1.20	1.16	1.14	1.11–1.19	1.21	1.14–1.25	1.30	1.18	1.15–1.20	1.20	1.15–1.26
FI	0.33	0.32–0.35	0.36	0.39	0.38–0.40	0.39	0.37–0.40	0.41	0.38–0.43	0.40	0.38	0.36–0.40	0.40	0.38–0.42	0.41	0.42	0.41–0.43	0.43	0.41–0.44
FLI	1.14	1.08–1.19	1.12	1.07	1.04–1.01	1.06	1.04–1.09	1.06	1.02–1.12	1.16	1.06	1.02–1.09	1.07	1.02–1.10	1.17	1.07	1.06–1.08	1.06	1.00–1.12
SI1	1.18	1.15–1.20	1.18	1.16	1.14–1.20	1.03	1.00–1.16	1.04	1.00–1.11	0.90	1.08	1.01–1.15	1.04	1.01–1.06	0.98	0.98	0.75–0.98	0.99	0.97–0.97
SI2	1.32	1.32–1.35	1.30	1.35	1.27–1.41	1.16	1.12–1.28	1.19	1.08–1.16	1.05	1.23	1.14–1.33	1.25	1.19–1.32	1.28	1.15	1.11–1.18	1.19	1.14–1.23
PI1	1.82	1.65–1.94	2.09	2.10	1.97–2.19	1.81	1.73–1.94	1.78	1.54–1.97	1.50	1.81	1.38–2.00	1.66	1.49–1.86	1.65	1.63	1.54–1.71	1.65	1.43–1.90
PI2	0.53	0.48–0.56	0.58	0.66	0.63–0.68	0.57	0.55–0.58	0.56	0.50–0.66	0.44	0.52	0.43–0.58	0.54	0.51–0.61	0.64	0.58	0.56–0.60	0.53	0.47–0.58
PPI1	1.02	0.94–1.10	1.14	1.13	1.08–1.18	1.03	0.98–1.16	0.87	0.76–1.03	1.00	0.80	0.66–0.98	0.80	0.71–0.90	1.00	0.99	0.95–1.02	0.85	0.76–0.95
PPI2	0.89	0.85–0.94	0.98	1.03	1.00–1.08	0.92	0.88–0.96	0.95	0.88–1.05	0.89	0.86	0.81–0.89	0.96	0.90–1.00	0.90	0.96	0.92–1.00	0.94	0.88–1.05
PPI3	1.61	1.60–1.63	1.59	1.55	1.49–1.63	1.51	1.43–1.61	1.48	1.33–1.62	1.41	1.56	1.48–1.63	1.65	1.50–1.74	1.41	1.58	1.50–1.62	1.54	1.48–1.59
ESLI	0.68	0.71–0.66	0.66	0.61	0.55–0.72	0.52	0.48–0.56	0.59	0.47–0.68	0.35	0.60	0.56–0.68	0.55	0.52–0.58	0.52	0.45	0.44–0.47	0.67	0.58–0.72
ESDI	0.80	0.63–0.99	0.88	0.83	0.74–0.88	0.93	0.80–1.05	0.85	0.66–1.09	0.91	0.82	0.76–1.06	0.89	0.76–1.06	0.95	0.78	0.76–0.79	0.93	0.74–1.16
HTI	1.11	1.10–1.14	1.11	1.18	1.09–1.30	0.98	0.93–1.08	1.08	0.98–1.18	1.05	1.08	1.02–1.15	1.14	1.05–1.20	1.16	1.04	1.06–1.08	1.03	0.94–1.06

10. *Myrmica martensi* sp. n. (Fig. 5).

Material examined: holotype worker, Nepal, Gosainkund, Sing Gyang, 3200 m, 26.04.1973, leg. T. Martens. Paratypes: 3 workers, 1 female (gynetype) with same label (probably same nest) as holotype (NHMB).

Workers. The head is subrectangular with somewhat convex sides, a straight occipital margin and well marked occipital corners; the upper latero-ventral corners are distinctly pointed or dentiform (seen in profile). The anterior clypeal margin is almost straight but distinctly notched medially. The frontal carinae are more or less straight or only very feebly curved, and do not curve outwards and do not merge with the rugae which surround antennal sockets. The frons is wide and the eyes are convex and oval, being situated slightly anteriorly of the mid point of the side of the head. The antennal scapes are relatively long despite being slightly shorter than the head, and are gradually and weakly curved at their bases; the funicular joints are distinctly longer than broad; the apical club is 4-jointed.

The alitrunk is long and low with a more or less flat promesonotum; the promesonotal suture is distinct and the mesopropodeal furrow is deep and distinct. The metapleural lobes are narrowly rounded at the apex and do not project apically as a sharp tooth. The propodeal spines are long and straight but distinctly shorter than those of the other species in the boltoni-complex, projecting posteriorly and upwards just under 45°, and diverging distinctly. The petiole is low and narrow, but distinctly shorter than that of the other species from the boltoni-complex, having a relatively short anterior peduncle, which is distinctly shorter than the petiolar node; the dorsum of the node is more or less flattened subhorizontally. The anterior and dorsal surfaces of postpetiole form a more or less regular but asymmetric arch with its apex distinctly posterior of the centre; the postpetiolar node is relatively small.

The head dorsum is densely but finely longitudinally rugulose with the surfaces between rugae being densely punctured and appearing dull; the mandibles are densely striated and the clypeus has only one fine medial longitudinal carina, otherwise with a fine lateral rugosity and is densely but finely punctured, appearing more or less shiny to submat. The frontal area is smooth and shiny. The alitrunk has irregular short sinuous rugae which are more feebly developed than in *M. boltoni*; the mesopleurae and sides of propodeum are longitudinally rugulose. The surfaces between these rugae and between the base of the propodeal spines, are smooth and shiny. Both the petiole and postpetiole are densely and finely punctured, appearing dull, but the central part of postpetiolar dorsum is very weakly punctinate, appearing more or less shiny. The gaster is smooth and shiny, with superficial reticulation less developed than that of *M. boltoni*.

The occipital margin of the head has a few straight outstanding hairs, but the temples and genae have none. The dorsum of the alitrunk, petiole, postpetiole and gaster have similar sparse hairs. The legs have subdecumbent hairs and those of the antennal scapes are suberect. A sparse, short, decumbent pilosity is present only on the gaster, legs and antennal scapes. The ant is a dark reddish-brown colour.

Female (dealate). The head is subrectangular with somewhat convex sides, a straight occipital margin and narrowly rounded occipital corners; the upper latero-ventral corners are distinctly pointed or dentiform (seen in profile). The anterior clypeal margin is slightly convex and is notched medially. The frontal carinae are very feebly curved, curving outwards and merging into the rugae which surround the antennal sockets. The frons is wide and the eyes are convex and oval, being situated somewhat anteriorly of the mid point of the sides of the head. The antennal scapes are long but shorter than head, being gradually and weakly curved at their bases; the funicular joints are longer than broad; the apical club is 4-jointed.

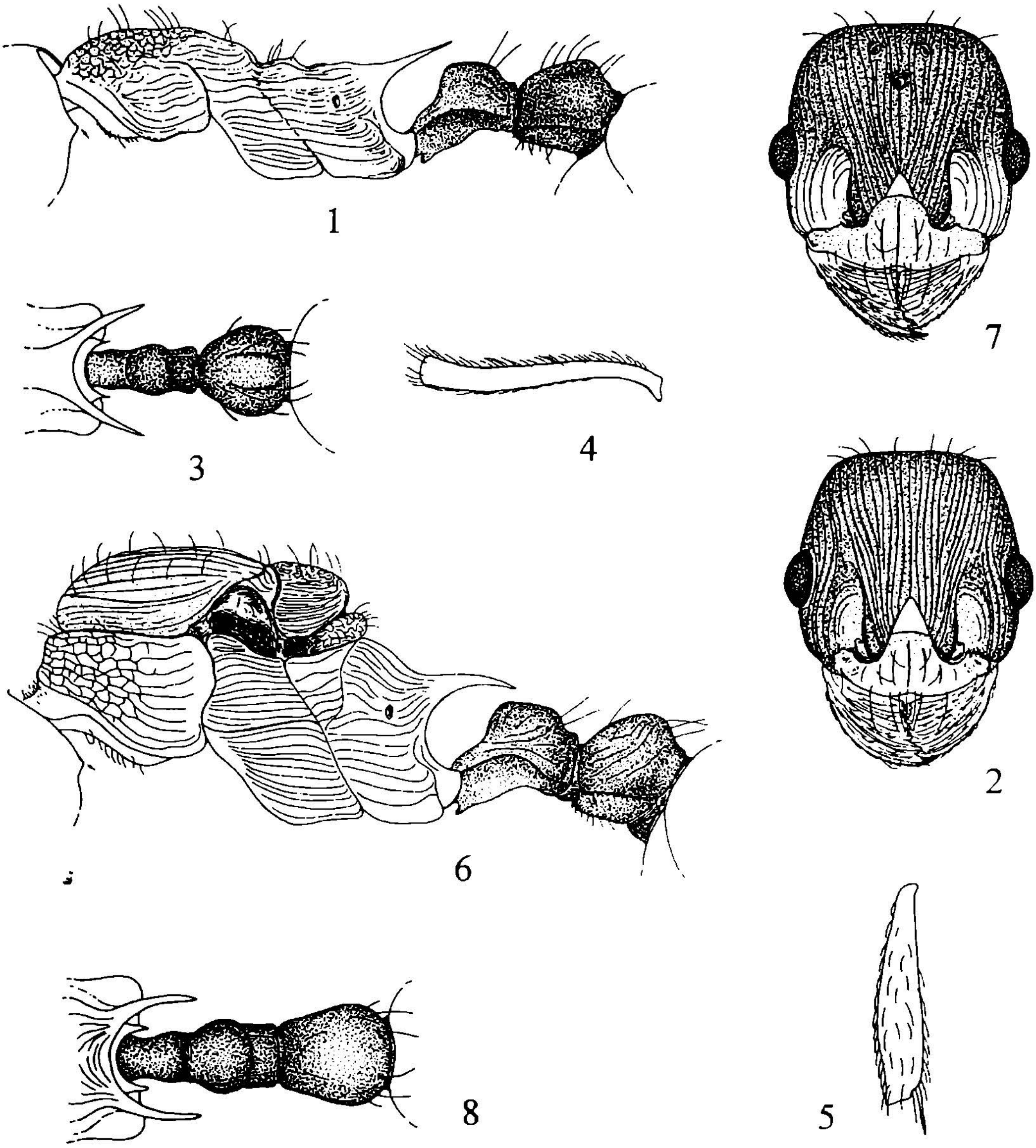


Fig. 5. *M. martensi* holotype worker (1–5) and gynetype female (6–8). 1, 6 — alitrunk, petiole and postpetiole in profile; 2, 7 — head, frontal view; 3, 8 — propodeal spine, petiole and postpetiole from above; 4 — antennal scape in profile; 5 — hind tibia.

Рис. 5. *M. martensi*, рабочий, голотип (1–5) и самка, гинетип (6–8). 1, 6 — грудь: петиолюс и постпетиолюс в профиль; 2, 7 — голова спереди; 3, 8 — шипы проподеума, петиолюс и постпетиолюс сверху; 4 — скапус антенны в профиль; 5 — задняя голень.

The alitrunk is relatively long and narrow, and the metapleural lobes are angulate at the apex and do not project as sharp tooth. The propodeal spines are long, projecting posteriorly and curving downwards, being slightly divergent. The petiole is relatively long but is distinctly higher and shorter that of the workers, having a long anterior peduncle. The anterior surface of the node is slightly convex, changing abruptly to the node dorsum, which is only very slightly convex with a straight posterior surface. The postpetiole is relatively low, being asymmetrically arched dorsally as in the workers.

The head dorsum is longitudinally rugulose. The clypeus has two strong medial carina-like rugae and finer lateral rugae. The surfaces between the rugae are densely punctured and appear submat, but the frontal area is smooth and shiny. The pronotum has short sinuous rugae and coarse reticulation, but the other parts of alitrunk are longitudinally rugulose. The surfaces between rugae, especially on scutum, scutellum and propodeum, are finely punctured but appear shiny. The surface between the propodeal spines is smooth and shiny. The petiole and postpetiole are punctured, appearing submat, and the sides of petiolar and postpetiolar nodes also have short fine rugae. The gaster is smooth and shiny.

The occipital margin of head has a few straight outstanding hairs and the temples and genae have none. The dorsum of the alitrunk, petiole, postpetiole and gaster have sparse, slightly curved hairs; the tibiae and antennal scape have numerous suberect hairs. A very sparse short decumbent pilosity is present only on the gaster and legs. The general colour is a dark reddish-brown but the legs and antennal scapes are light reddish-brown.

Notes. Males are unknown. Measurements and indices are given in Tables 1-3. *M. martensi* is closely related to *M. boltoni* from which the workers differ by shorter, upward-pointing and distinctly divergent propodeal spines, by a distinctly shorter petiole and by its more feebly developed sculpture on alitrunk and pedicel. The queen differs from other known females of the *ritae* group by having much less coarse sculpture of the body, and distinctly punctured surfaces between rugae on the head and alitrunk dorsums. Its ecology is unknown.

11. *Myrmica collingwoodi* sp. n. (Figs. 6)

Material examined: holotype worker, Dorjula [Bhutan], 3100 m, 26.06; Nat.-Hist. Museum NHMB — Bhutan Expedition 1972, Alk. No 56 (BASLE). Paratypes: 9 workers and 1 female with same label (probably same nest) as holotype; 6 workers with same label but date of collecting 6.06; 6 workers, Dorjula, 2450–3100 m, 6.06; Nat.-Hist. Museum NHMB — Bhutan Expedition 1972, No 24–36 (BASLE, BMNH, SIZK, ELMES).

Workers. The head is subrectangular with sub parallel sides, a slightly convex occipital margin and rounded occipital corners; the upper latero-ventral corners are distinctly pointed or dentiform (seen in profile). The anterior clypeal margin is straight but distinctly notched medially. The frontal carinae are more or less straight or only very feebly curved and do not curve outwards and do not merge into the rugae which surround the antennal sockets. The frons is wide and the eyes are convex and oval, being situated somewhat anterior to the mid point of the sides of the head. The antennal scapes are long but shorter than head, and are gradually and weakly curved at their bases; the funicular joints distinctly longer than broad; the apical club is 4-jointed.

The alitrunk has a long, low, slightly convex promesonotum. The promesonotal suture is distinct and the mesopropodeal furrow is distinct but shallow. The metapleural lobes project apically to form a sharp tooth. The propodeal spines are very long and straight, projecting posteriorly and upwards at < 30°, and diverging slightly. The petiolar node is long, low and narrow, being somewhat longer than the anterior peduncle and having a flattened and subhorizontal dorsum. The anterior and dorsal surfaces of

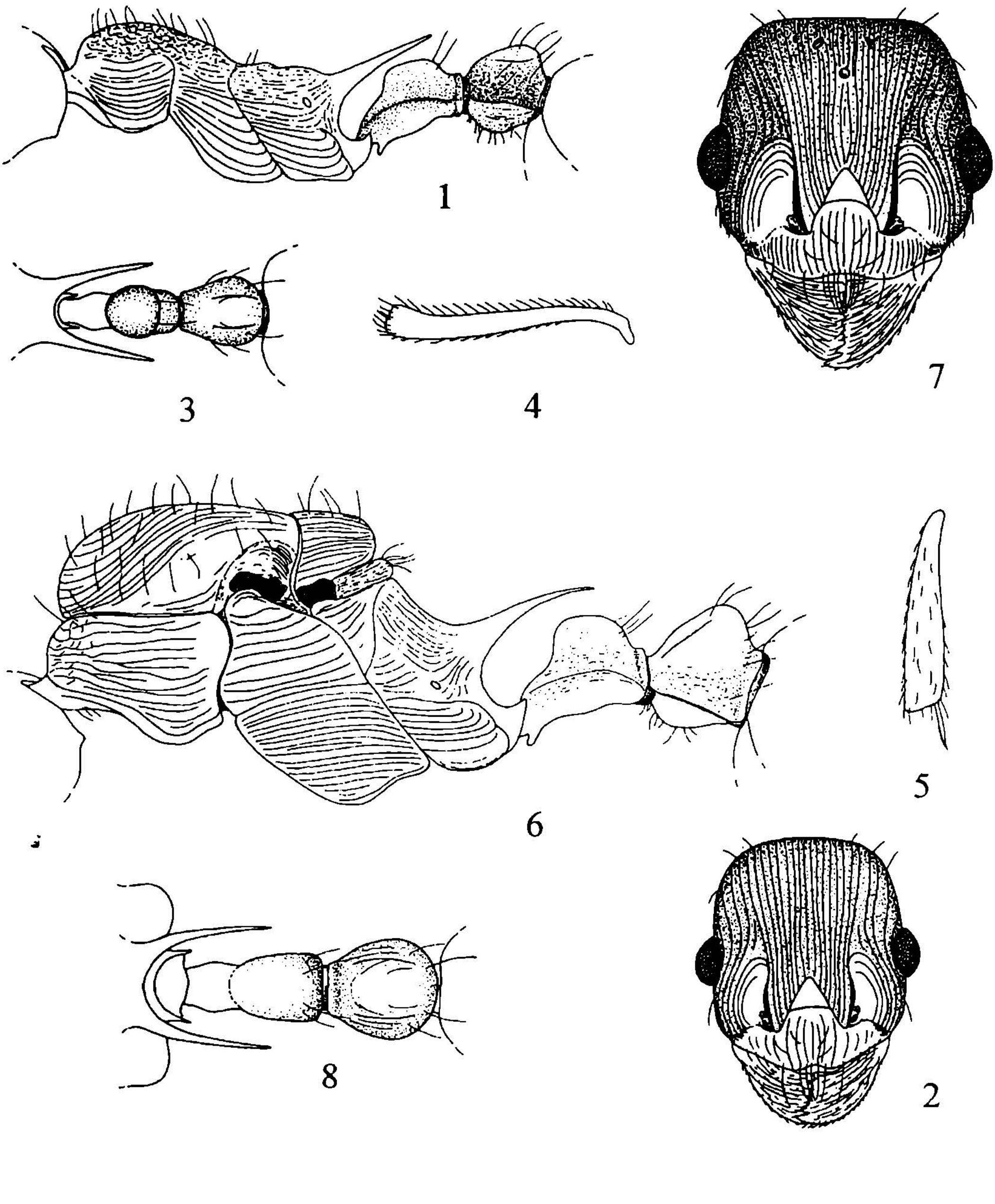


Fig. 6. *M. collingwoodi* holotype worker (1–5) and gynetype female (6–8). 1, 6 — alitrunk, petiole and postpetiole in profile; 2, 7 — head, frontal view; 3, 8 — propodeal spine, petiole and postpetiole from above; 4 — antennal scape in profile; 5 — hind tibia.

Рис. 6. *M. collingwoodi*, рабочий, голотип (1–5) и самка, гинетип (6–8). 1, 6 — грудь: петиолюс и постпетиолюс в профиль; 2, 7 — голова спереди; 3, 8 — шипы проподеума, петиолюс и постпетиолюс сверху; 4 — скапус антенны в профиль; 5 — задняя голень.

the postpetiole form a more or less regular but asymmetric arch, with its apex distinctly posterior of the centre; the postpetiolar node is relatively small.

The head dorsum is densely but not coarsely, longitudinally rugulose, and the surfaces between the rugae are densely but very finely punctured and appear shiny. They are much less coarsely punctured than in *M. boltoni* and *M. martensi.* The mandibles are densely striated and shiny, the sculpture on the clypeus is similar that of the frons and the frontal area is smooth and shiny. The dorsum of the promesonotum is finely, transversally and concentrically, rugoso-striated. The dorsum of the propodeum has very fine short longitudinal striations, the propleurae are longitudinally rugoso-striated and the mesopleurae and sides of propodeum are longitudinally rugulose. The surfaces between these striae and rugae are at most, very finely and superficially punctured, appearing shiny, while the surface between the base of the propodeal spines is smooth and shiny. Both the petiole and postpetiole are finely punctured and appear more or less shiny or at least, the central part of postpetiolar dorsum is smooth and shiny. The sides of petiolar node also have short fine striation. The gaster is smooth and shiny with very fine superficial reticulation.

The occipital margin of head, the temples and genae have a few outstanding hairs; the dorsum of the alitrunk, petiole, postpetiole, and gaster have similar sparse hairs. The hairs on the legs are subdecumbent while those on the antennal scapes are suberect. A sparse short, decumbent pilosity is present only on gaster, legs and antennal scapes. The alitrunk and pedicel are reddish to light reddish-brown and the head, antennae and gaster are reddish-brown.

Female (dealate). The head is subrectangular with somewhat convex sides, a straight occipital margin and rounded occipital corners; the upper latero-ventral corners are pointed but not dentiform, only angulate (seen in profile). The anterior clypeal margin is slightly convex and is notched medially. The frontal carinae are very feebly curved but do not curve outwards do not merge into the rugae which surround antennal sockets. The frons is wide and the eyes are convex and oval, being situated somewhat anteriorly of the mid point of the sides of the head. The antennal scapes are long but shorter than the head, being gradually and weakly curved at their bases; the funicular joints are longer than broad; the apical club is 4-jointed.

The alitrunk is long and narrow, and the metapleural lobes project apically to form a sharp tooth. The propodeal spines are very long, projecting posteriorly and curving slightly downwards, appearing sub parallel from above. The petiole is long, but distinctly higher and shorter than in the workers, having a long anterior peduncle. The anterior surface of the petiolar node is slightly convex, merging abruptly into the dorsum node, which is only very slightly convex, with a straight posterior surface. The postpetiole is relatively high and short, its anterior and dorsal surfaces form a more or less regular arch; the top is rounded but the posterior surface is straight and starts abruptly.

The head dorsum is longitudinally rugulose and the clypeus has numerous identical rugae. The surfaces between the rugae are punctured and appear submat. The frontal area is smooth and shiny. The alitrunk (except scutellum) is longitudinally rugulose whereas the scutellum has concentric rugae. The surfaces between the rugae and the propodeal spines appear smooth and shiny. The sides of the petiole have short striae and fine rugae, and the dorsum of the petiolar node is densely punctured. The sides of postpetiole have very fine short striae but its dorsum and anterior surfaces are smooth and shiny.

The occipital margin of the head and genae have a few outstanding hairs but the temples have none. There are sparse slightly curved hairs on the dorsum of alitrunk, petiole, postpetiole and gaster; the tibiae and antennal scapes have numerous subdecumbent hairs. A very sparse, short, decumbent pilosity is presents only on the gaster

and legs. The body is a dark reddish-brown and the legs and antennal scapes are a light reddish-brown.

Notes. Males are unknown. Measurements and indices are given in Tables 1-3. *M. collingwoodi* is closely related to the other species of the boltoni-complex, but differs from both the others by its much more finely punctured head dorsum, by the sculpture of its alitrunk dorsum, by possession of outstanding hairs on the temples and genae, and by its lighter colour. It also differs from *M. martensi* by its distinctly longer propodeal spines, and from *M. boltoni* by its straight propodeal spines, which are directed backwards and upwards.

A Key for the identification of species of ritae group of the genus *Myrmica*

1. Head and alitrunk very coarsely rugose, surface between rugae on the head dorsum smooth (Figs. 1, *1, 2, 4, 5, 7, 8, 10*; 2, *1, 2*; 3, *1, 2*; 4, *1, 2, 6, 7*) 2
- Head and alitrunk much more finely rugose or even striated, surface between rugae on the head dorsum distinctly punctured (Figs. 4, *11, 12*; 5, *1, 2*; 6, *1, 2*) 9
2. Anterior clypeal margin prominent, not notched medially (Fig. 4, *7*). Petiole with a very thin anterior peduncle and a node which appears more or less square in profile; sculpture of the petiolar and postpetiolar nodes much less coarse than on the head and alitrunk (Fig. 4, *6*) ..... *M. rigatoi* **sp.n.**
- Anterior clypeal margin not prominent, straight and notched medially (Figs. 1, *2, 5, 8, 10*; 2, *2*; 3, *2*; 4, *2*). Petiole with thick anterior peduncle and with a node which is not square in profile. The sculpture of the petiolar and postpetiolar nodes coarse, as on the head and alitrunk (Figs. 1, *1, 4, 7*; 2, *1*; 3, *1, 7*; 4, *1*) 3
3. Head dorsum with straight longitudinal rugae (Fig. 1, *2*). Head reddish yellow, distinctly contrasting with dark brown alitrunk ..... *M. ritae* Emery
- Head dorsum with sinuous longitudinal rugae (Figs. 1, *5, 8, 10*; 2, *2*; 3, *2*; 4, *2*). Head not distinctly lighter than alitrunk 4
4. Alitrunk dorsum with only few outstanding hairs (Fig. 1, *4*) ..... *M. margaritae* Emery
- Alitrunk dorsum with numerous outstanding hairs (Figs. 1, *7*; 2, *1*; 3, *1*; 4, *1*) 5
5. Frons between frontal carinae level with the eyes, having four extremely coarse rugae (Fig. 1, *8*) ..... *M. formosae* Wheeler
- Frons between frontal carinae level with the eyes, having not less than six finely rugae (Figs. 2, *2*; 3, *2*; 4, *2*) 6
6. Temples without outstanding hairs or only with a few short straight ones (Fig. 3, *2*). Head, alitrunk and pedicel from dark brown to black, gaster from reddish brown to dark brown, legs and antennal scape reddish brown ..... *M. indica* Weber
- Temples with numerous curved long outstanding hairs (Figs. 2, *2*; 4, *2*). Head, alitrunk and pedicel from reddish brown to dark brown, gaster from brownish yellow to reddish brown, legs from yellow to reddish yellow, antennal scape brownish red 7
7. Upper third of head dorsum with distinct reticulate sculpture, only frons with sinuous rugae (Fig. 4, *2*) 8
- Head dorsum with sinuous rugae, only postero-lateral part of it with reticulate sculpture (Fig. 2, *2*) ..... *M. serica* Wheeler
8. Large ant (HW = 1.62 mm, AL = 2.58 mm) but propodeal spines relatively short (ESLI = 0.35). Dorsum of petiole distinctly shorter (Fig. 3, *11*). Antennal scape relatively short (SI1 = 0.90) and more strongly curved at the base (Fig.3, *12*) ..... *M. gigantea* Collingwood
- Smaller ants (HW < 1.35 mm, AL < 2.38 mm). Propodeal spine distinctly relatively longer (ESLI 0.56–0.68). Dorsum of petiole very long (fig. 4, *1*). Antennal scape relatively long (SI1 = 1.01–1.06) and weakly curved at the base (Fig.4, *4*). ..... *M. urbanii* sp nov.
9. Surface between rugae on the head dorsum finely punctured, more or less shining (Fig. 6, *2*). Dorsum of alitrunk with fine irregular striae; nodes of petiole and postpetiole with very fine superficial sculpture or even smooth, shining (Fig. 6, *1*) ..... *M. collingwoodi* sp. n.
- Surface between rugae on the head dorsum densely and coarsely punctured, dull (Figs. 4, *12*; 5, *2*). Dorsum of alitrunk with reticulate sculpture; nodes of petiole and postpetiole densely punctured, submat (Fig. 4, *11*; 5, *1*) 10
10. Propodeal spines very long (ESLI 1.50–1.74), directed more or less backwards and slightly curved downwards, sub parallel to the dorsal surface of propodeum and slightly divergent (ESDI 0.76–1.07); postpetiole relatively long and low (PPI1 0.71–0.90) (Fig. 4, *11*) ..... *M. boltoni* sp. n.
- Propodeal spines straight and relatively shorter (ESLI 0.44–0.47), pointing upwards at an angle of just less than 45° and diverging distinctly (ESDI 1.26–1.31); postpetiole relatively shorter and higher (PPI1 0.95–1.02) (Fig. 6, *1*) ..... *M. martensi* sp. n.

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